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Expression and characterisation of single-chain antibody fragments produced in transgenic plants against the organic herbicides atrazine and paraquat.

Longstaff M, Newell CA, Boonstra B, Strachan G, Learmonth D, Harris WJ, Porter AJ, Hamilton WD.

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Single-chain antibody fragments (scAbs), which have a human C-kappa constant domain and a hexa-histidine tail attached to the carboxy terminus of the single-chain Fv (ScFv) fragments to facilitate purification, have been raised against the herbicides paraquat and atrazine and expressed in transgenic *Nicotiana tabacum* cv. Samsun NN. Prior to purification, the anti-atrazine scAb is expressed as up to 0.014% of soluble leaf protein and has a binding profile in ELISA, against an atrazine-bovine serum albumin (BSA) conjugate, similar to that of the scAb produced in *Escherichia coli*. Competition ELISA has shown that the plant-derived scAb also recognises free atrazine. Following antibody affinity purification to isolate dimers, the affinity for immobilised antigen approaches that of the parental monoclonal antibody. This was confirmed by surface plasmon resonance analysis. The purified scAb also recognises related triazine herbicides. When isolated from cell-suspension cultures, the anti-paraquat scAb binds to a paraquat conjugate in a concentration-dependent manner, with a profile similar to the parental monoclonal antibody. This is the first demonstration that functional scAbs against organic pollutants can be produced in transgenic plants and that the scAbs may be appropriate for the development of immunoassay-based detection systems. Copyright 1998 Elsevier Science B.V. All rights reserved.

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